

Oceanic Convective Systems: ASCAT and NEXRAD Retrieval Analysis

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1. Introduction

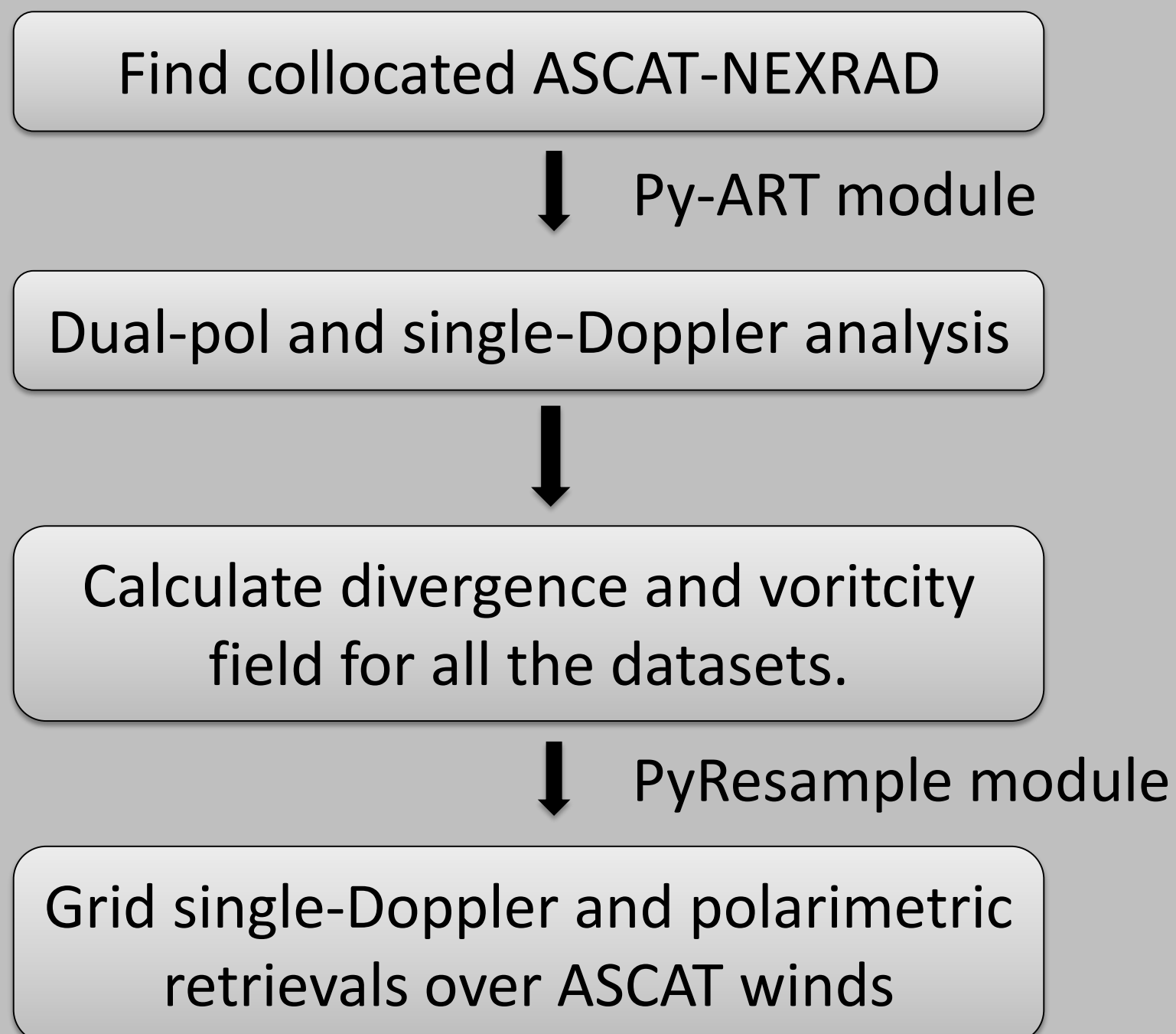
- Advanced Scatterometer (ASCAT) on-board MetOp A,B:
 - Operating at C-band (5.2 GHz)
 - Measures the backscatter power related to the surface roughness -> wind vector
 - Sensitive at high wind speeds
 - Prone to attenuation effects under precipitation
- ✧ Approximately 45 minutes time interval between ASCAT A, B -> Unique opportunity to explore the evolution of maritime convection.
- Next Generation Radars (NEXRAD):
 - Coastal network over the US continent
 - Operating at S-band (10 cm)
 - Not heavily affected by precipitation
 - Dual-polarization capabilities (Z_{dr} , K_{dp} , etc.)
 - Improved rainfall rate estimation
 - Well-developed hydrometeor algorithms (HID) for S-band (liquid and ice masses, D_0 , etc.)
 - Single-Doppler retrieval of the wind field

2. Motivation

Leveraging the constellation of space- and ground-based instrumentation, we seek to explore the characteristics of maritime storms.

- Which radar- and scatterometer-observed characteristics indicate strong maritime convection?
- How are the radar-derived mass estimates related to the ASCAT winds?

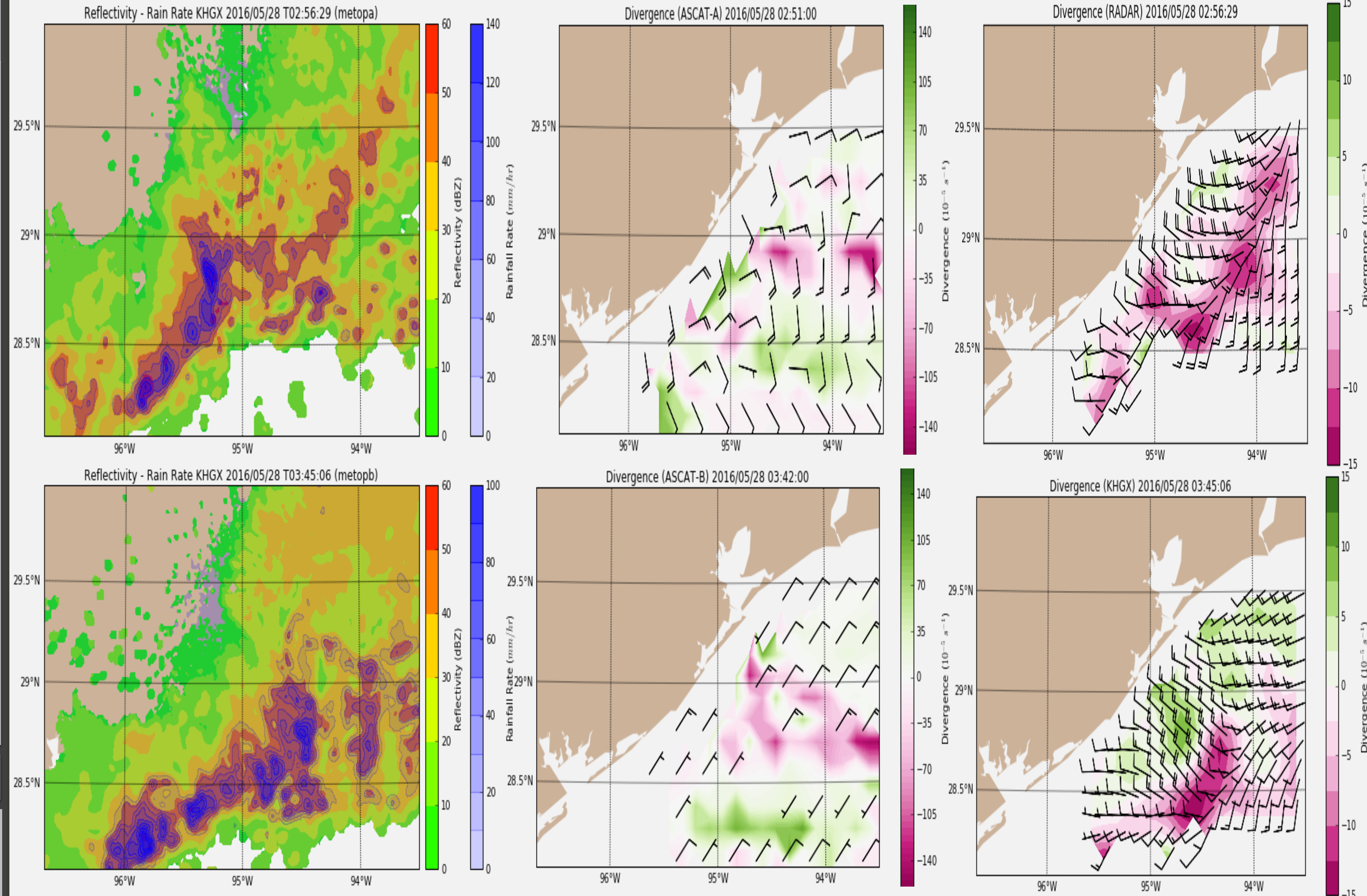
3. Methodology



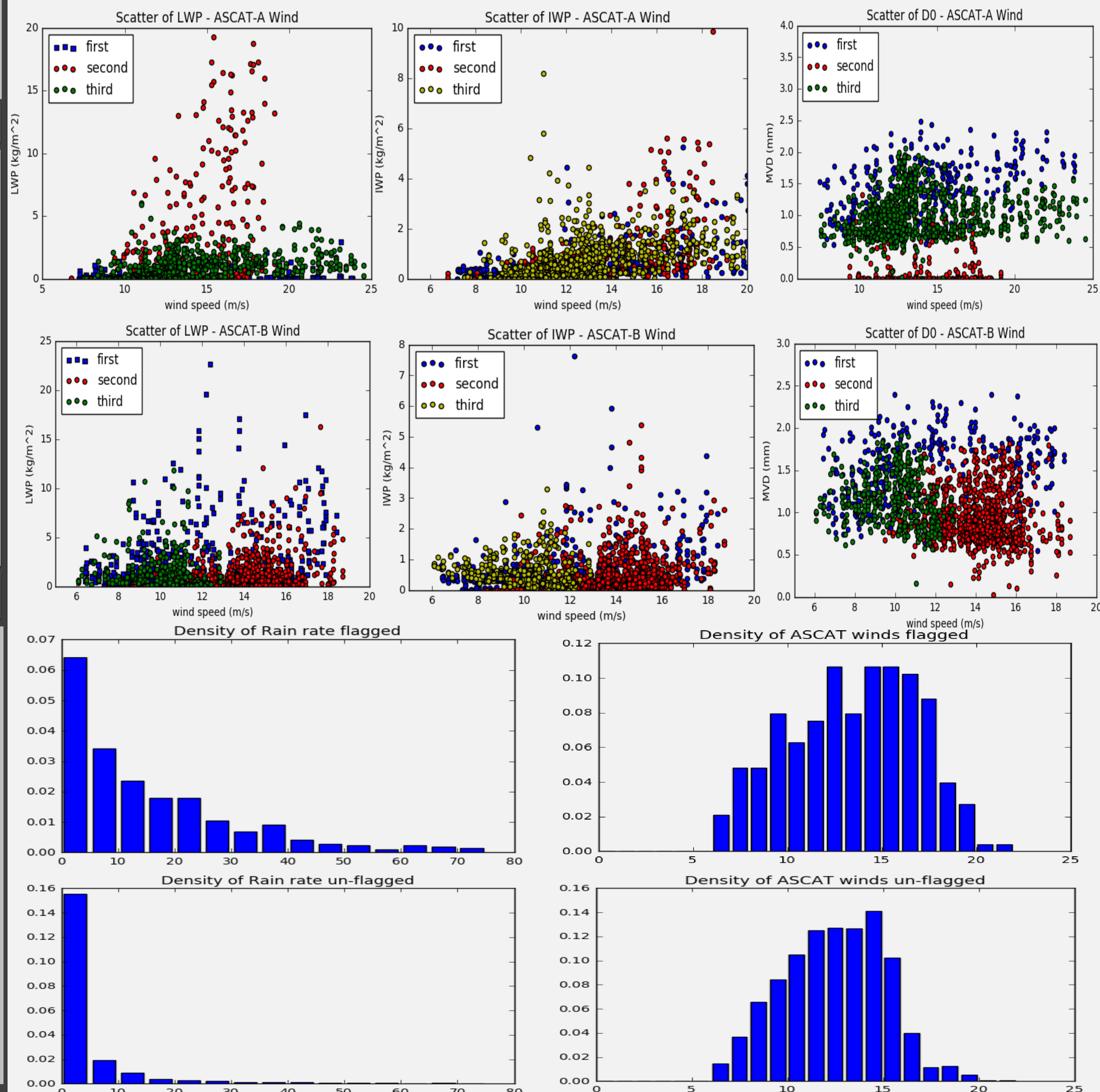
5. Discussion

- LWP and wind speed tend to be positively correlated when LWP is high.
- ASCAT quality control flags and high wind speed estimates are collocated with the high-LWP regions.
- 87% of the **non**-flagged ASCAT data correspond to polarimetric NEXRAD rain rates < 6 mm/hr.
- ASCAT-B cannot observe rear-inflow jet seen in KHGX radar retrieval due to rain contamination.
- Although the majority of the data are flagged by ASCAT, they provide useful insight for rain contamination and ASCAT quality flags.
- Other cases of strong oceanic convection exhibit similar characteristics, demonstrating utility of combining coastal/island polarimetric Doppler radar and satellite scatterometer.

4a. Case Study [Houston 05/28/2016]



4b. Bulk Results for Three Cases – ASCAT Quality Flags



6. Acknowledgements

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